

ABSTRACT OF THE DISCLOSURE

An apparatus for producing an electron beam, comprising a support structure; a miniature ultrahigh vacuum chamber comprising a superconducting single walled metallic-type carbon nanotube comprised of a cylindrical wall, a proximal end disposed upon and sealed to the support structure, and a distal end comprising an electron-transparent structure; an electron beam emitting tip comprising a second carbon nanotube embedded in the support structure and disposed within the superconducting single walled metallic-type carbon nanotube, the second carbon nanotube having an inner surface with a thin conductive coating disposed thereupon; and means for creating an electrical potential difference between the electron beam emitting tip and the cylindrical wall of said superconducting carbon nanotube. There is also provided a scanning electron microscope comprising an enclosed point source electron beam generator disposed within a conically tapered enclosure having a proximal end and a distal end, the proximal end in communication through an opening therein with a vacuum tube, and the distal end comprising a conical pipette tip target opening.